2109

PROJECT SPECIFIC PLAN FOR AREA 1, PHASE II EXCAVATION MONITORING AND PRECERTIFICATION

SOIL CHARACTERIZATION AND EXCAVATION PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

INFORMATION ONLY

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LIST OF ACRONYMS AND ABBREVIATIONS

A1PII	Area 1, Phase II
ASL	analytical support level
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
DQO	Data Quality Objective
FDF	Fluor Daniel Fernald
FEMP	Fernald Environmental Management Project
FRL	final remediation level
GPS	global positioning system
HPGe	high purity germanium
IRDP	Integrated Remedial Design Package
LAN	Local Area Network
NaI	sodium iodide
OSDF	On-Site Disposal Facility
PPE	personal protective equipment
ppm	parts per million
PSP	Project Specific Plan
PWID	Project Waste Identification and Disposition
QA/QC	Quality Assurance/Quality Control
QA	Quality Assurance
RCTs	Radiological Control Technicians
RSS	Radiation Scanning System
RTIMP	Real-Time Instrumentation Measurement Program
RTRAK	Radiation Tracking System
RWP	Radiological Work Permit
SCEP	Soil Characterization and Excavation Project
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
STP	Sewage Treatment Plant
SP-7	Soil Stockpile 7
V/FCN	Variance/Field Change Notice
WAC	Waste Acceptance Criteria
WAO	Waste Acceptance Organization

1.0 INTRODUCTION

This project-specific plan (PSP) describes the excavation monitoring activities that will be performed during the Remedial Action (RA) in Area 1, Phase II (A1PII), which includes the Sewage Treatment Plant (STP) and adjacent areas. RA activities are outlined in the A1PII Integrated Remedial Design Package (IRDP) and the A1PII Supplemental Characterization Package. The data collected under this plan will be used to support two objectives: 1) to determine whether soil and soil-like material excavated from the area meets the waste acceptance criteria (WAC) for the On-Site Disposal Facility (OSDF), and 2) to collect data to determine if all material with contamination above Final Remediation Levels (FRLs) has been excavated so that A1PII is ready for precertification. All data collection activities will conform to the requirements in Section 7.0 and in the documents listed below.

- *Sitewide Excavation Plan*, 2500-WP-0028, Revision 0, July, 1998
- *Area 1, Phase II Integrated Remedial Design Packages,* 20710-PL-002, Revision D, September,1998.
- *Area 1, Phase II Supplemental Characterization Package,* 20710-PL-005, Revision C, September,1998.
- *Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility*, 20100-PL-0014, Revision 0, June,1998
- *Impacted Materials Placement Plan*, 20100-PL-0007, Revision 0, January, 1998
- *User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectroscopy at the Fernald Site* (User's Manual), 20701-RP-0006, Revision B, July, 1998
- *In-Situ Gamma Spectroscopy Addendum to the Sitewide CERCLA Quality Assurance Project Plan*, FD-1000, August, 1998
- *Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)*, Data Quality Objective (DQO) SL-051, Revision 1, June, 1998
- *Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality (SCQ) Assurance Project Plan,* FD-1000, Revision 1, September,1998.

1.1 PURPOSE

The purpose of this PSP is to describe data collection activities and the decision process required to determine if A1PII material meets the OSDF WAC. As described in the A1PII STP Excavation Package technical specifications, the excavation contractor will excavate and remediate A1PII, including removal of above-WAC material, deep excavation in the STP, removal of utilities, stripping of surface contamination, and stockpile removal.

The general sequence for excavation will be the removal of above-WAC material, removal of material in 3 ±1 foot lifts, and then deep excavations to design limits. Monitoring will be performed throughout excavation. Precertification will be performed after excavation to design limits. The excavation monitoring will consist of visual monitoring, real-time *in situ* gamma spectroscopy, and physical sampling. This monitoring will supplement historical data and predesign investigation data in determining WAC attainment.

1.2 SCOPE

The scope of this PSP includes excavation monitoring of the following activities:

- Removal of above-WAC Digester Sludge
- Removal of Sludge Cake
- Excavation of above-WAC technetium-99 material
- Removal of underground utilities both inside and outside the STP area
- STP deep excavations
- Stripping of surface contamination outside the STP
- Stockpiles and surface soil
- Special materials
- Excavation of stabilized lead contaminated soil.

This PSP will outline the sampling and monitoring requirements for each of these activities.

1.3 KEY PERSONNEL

Personnel responsible for conducting work in accordance with this PSP include team members from the SCEP, the Waste Acceptance Organization (WAO), Real-Time Instrumentation Measurement Program (RTIMP), Surveying, Construction, Safety and Health, Radiological Control, and QA personnel. Communications with the STP Excavation Contractor will be through Fluor Daniel Fernald (FDF) Construction personnel. Key project personnel are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

TITLE	PRIMARY	ALTERNATE
A1PII Area Project Manager	Tony Klimek	J.D. Chiou
Characterization Lead	Alex Duarte	Jenny Vance
RTIMP Manager	Joan White	Dale Seiller
RTIMP Field Lead	Dave Allen	Dale Seiller
Survey Lead	Jim Schwing	Jim Capannari
Laboratory Contact	Bill Westerman	Keith Tomlinson
Field Data Management Lead	Jenny Vance	Alex Duarte
Construction	Rick McGuire	Chris Neumann
Safety and Health Contact	Lewis Wiedeman	Debra Grant
Radiological Control Contact	Corey Fabricante	Dan Stempfley
Quality Assurance Contact	Reinhard Friske	Mary Eleton
WAO Contact	Christa Walls	Linda Barlow

2.0 AREA-SPECIFIC SAMPLING AND MONITORING

The remedial actions in A1PII can be generally divided into activities performed inside versus outside the STP area. Figure 2-1 shows a general excavation and monitoring sequence for the remedial actions to be performed inside the STP area. Remedial actions will begin with the removal of the above-WAC digester sludge and the excavation of enough above-WAC technetium-99 soil to blend with the digester sludge at a 2:1 ratio and then hauled to Soil Stockpile 7 (SP-7). The filter fabric separating the digester sludge and the above-WAC sludge cake and material mixed with the above-WAC sludge cake will be removed, containerized, and transferred to the Special Materials Transfer Area. The area will then sampled for technetium-99 and scanned with real-time instrumentation. If sampling or monitoring shows additional above-WAC contamination, spot excavations will be performed. If sampling shows below-WAC conditions, the sludge cake material and filter fabric will be removed, containerized, and transferred to the Special Materials Transfer Area. The area will be then be scanned with real-time instrumentation, and spot excavations will be performed if above-WAC conditions are found. If real-time measurements show the below-WAC conditions, the excavation will proceed in 3 ± 1 foot lifts, with real-time monitoring performed between lifts. It is anticipated that after two lifts, the excavation will be physical constrained and scanning will not be possible because of safety concerns. Based on review of these conditions in the field by DOE and the regulatory agencies, the excavation is then anticipated to proceed to the design depths. The remedial actions that will occur inside the STP and are discussed in further detail in following sections:

- Section 2.1 Above-WAC Digester Sludge
- Section 2.2 Above-WAC Sludge Cake
- Section 2.3 Excavation of Above-WAC Technetium-99 Material
- Section 2.4 Underground Utilities
- Section 2.5 STP Deep Excavations

Remedial actions occurring outside of the STP area are discussed in the following sections:

- Section 2.6 Stripping Surface Contamination Outside The STP
- Section 2.7 Stockpiles
- Section 2.8 Stabilized Lead-Contaminated Soil

Note that Section 2.4 also discusses the removal of underground utilities outside the STP area. Section 2.9, Special Material, addresses the discovery of suspected above-WAC material encountered during remedial activities.

2.1 ABOVE-WAC DIGESTER SLUDGE

The above-WAC digester sludge is located at three locations: the Digester Building, the West Chamber of the primary settling basin, and in the sludge drying beds. As discussed in the A1PII Supplemental Characterization Package, the digester sludge will be stabilized in the STP by combining it with above-WAC technetium-99 contaminated soil then hauled to SP-7. After the above-WAC sludge cake is excavated and removed from the sludge drying beds, the underlying filter fabric and sludge cake will be removed from the sludge drying beds (Section 2.2). Once the digester sludge is removed from the Digester Building and the West Chamber, the interior walls will be visually monitored to ensure all the digester sludge has been removed.

2.2 ABOVE-WAC SLUDGE CAKE

After the removal of the above-WAC digester sludge, the above WAC sludge cake and material contaminated with above-WAC sludge cake (including the geotextile and surrounding soil berm) will be removed and containerized. The excavation limits for above-WAC sludge cake and associated material will be determined based on visual observations. The exact limits of the berm to be classified as above-WAC will be determined based on visual observation. Once the sludge cake and above-WAC digester sludge are removed, the sludge drying beds will be sampled for technetium-99 and scanned using real-time monitoring equipment. The real-time scanning will be performed by high purity germanium detector (HPGe) measurements, and physical sampling will consist of four samples as shown on Figure 2-1. These samples will be collected to confirm that above-WAC technetium-99 contaminated material did not further contaminate the area, particularly in the sludge drying bed area. The four samples in the sludge drying beds will be collected and analyzed before additional excavation is performed in the area. Once the sampling/analysis and scanning are complete and the above-WAC material is confirmed to be removed, the contractor will proceed to the designed excavation limits which will be performed in 3 ± 1 foot lifts.

2.3 EXCAVATION OF ABOVE-WAC TECHNETIUM-99 MATERIAL

The above-WAC excavation technetium-99 locations have all been delineated by pre-design sampling and analysis for technetium-99. The excavation will be staked in the field and visually monitored. Field surveying will be performed to verify that the required 6" excavation has been performed. Once the above WAC technetium-99 has been removed and the field survey is complete, the area will be scanned for total uranium using real-time instrumentation.

2.4 UNDERGROUND UTILITIES

Underground utilities excavation is described in detail in Section 4.0 of the A1PII Supplemental Characterization Package and on the Construction Drawings. Based on preliminary information (direct radiological readings from soil cores) from additional sampling of the pipe bedding material both inside and outside of the STP, the bedding material and surrounding soil is anticipated to be below-WAC. However, all the samples associated with this sampling event have not been completed. For the purposes of this PSP, it will be assumed that the pipe bedding sampling will confirm that the material is below WAC. Changes to this assumption will be covered in a variance, if necessary. Therefore, during utility removal, no additional sampling or monitoring will be required except if visual inspection shows potential leakage or discoloration. Also, during the removal of utilities outside the STP, precertification HPGe scanning and certification samples will be collected from the soil in place below the pipe bedding prior to backfill.

2.5 STP DEEP EXCAVATIONS

After the digester sludge, above-WAC soil, and underground utilities are removed, and the above-WAC sampling and real-time monitoring is completed, the STP deep excavation will be performed. Visual monitoring will be performed on a continual basis. This excavation includes the removal of at- and below grade structures. Initially the contractor will excavate two 3 ± 1 foot lifts, with real-time scanning performed at the completion of each lift for uranium WAC compliance. It is anticipated that after two lifts, the excavation will be physically constrained. Based on review of these conditions in the field by DOE and the regulatory agencies, the excavation is then anticipated to proceed to the design depths. Upon attaining the design limits, as much possible real-time coverage in the excavation area will be performed. The primary constraint to maximizing real-time coverage will be safely accessing the excavation area.

2.6 STRIPPING SURFACE CONTAMINATION OUTSIDE THE STP

The area adjacent to the STP will be stripped six inches. Field surveying will be performed to verify that the required 6" excavation has been performed. After the area is stripped, a real-time scan will be performed in the excavation footprint.

2.7 STOCKPILES

A1PII stockpiles will consist of two existing stockpiles (NAR-007 and OSD-007) located in the A1PII excavation area, and any additional stockpiles created during excavation. If characterization of any new stockpiles is necessary, it will be documented in a variance to this PSP. As discussed in the *Area 1 Stockpile Inventory and Waste Acceptance Criteria Attainment Report*, 20700-RP-0001, July 1998; the two existing stockpiles (NAR-007 and OSD-007) have been adequately characterized and the removal of these piles will not be performed in lifts or require excavation monitoring, similar to the removal of the A1PI East and West Impacted Stockpiles. Once the stockpiles are removed and at the original grade, a Radiation Tracking System (RTRAK) scan will be performed for WAC determination. If the area is shown to be below WAC, an additional six inches will be excavated. An additional RTRAK scan will be performed in the excavation footprint for FRL attainment.

2.8 STABILIZED LEAD-CONTAMINATED SOIL

Upon completion of the lead stabilization, the Trap Range area will be excavated to the design limits and placed into the OSDF. Since historical data shows no above-WAC radiological conditions in the area, the excavation will not require lifts or to be monitored with real-time instrumentation. Once the lead-stabilized soil is removed, the area will be surveyed to ensure the excavation is complete; then, a precertification real-time scan will be performed.

2.9 SPECIAL MATERIAL

Special materials encountered during excavation will be individually assessed for WAC determination. If requested by the Characterization Lead or designee, a gamma measurement can be taken over the residual soil where special materials were located and removed during excavation or where elevated (greater than 200 K disintegrations per minute) beta/gamma levels have been detected with field monitoring instruments. If alpha measurements are requested and the instrument readings are less than beta/gamma readings, the gamma measurements can be taken with the RTRAK, Radiation

Scanning System (RSS), or HPGe, depending on the configuration of the special materials excavation footprint. If beta/gamma field instrument readings are less than alpha readings, the gamma measurements must be taken with HPGe. If RTRAK or RSS is deployed, use the same parameters as described in Section 2.3.1 of this PSP (single measurement trigger level potentially requiring confirmation and delineation by the HPGe for total uranium will be 721 ppm. If the HPGe is deployed, the most appropriate detector height will be used for the applicable field of view with a spectral acquisition time of 5 minutes. The HPGe potential WAC exceedance trigger level for total uranium is 928 ppm for 15 or 31 cm measurements HPGe measurements and 400 ppm for 1 meter measurements. The measurement numbering scheme is as follows:

Excavation Area-Special Materials-Sequential Number-HPGe Measurement

Where: Excavation Area = STP
Special Materials = SM
Sequential Number = 1, 2, 3, etc.
HPGe Measurement (if applicable) = G

Each Special Material measurement location will be surveyed to obtain a unique northing, easting, and elevation.

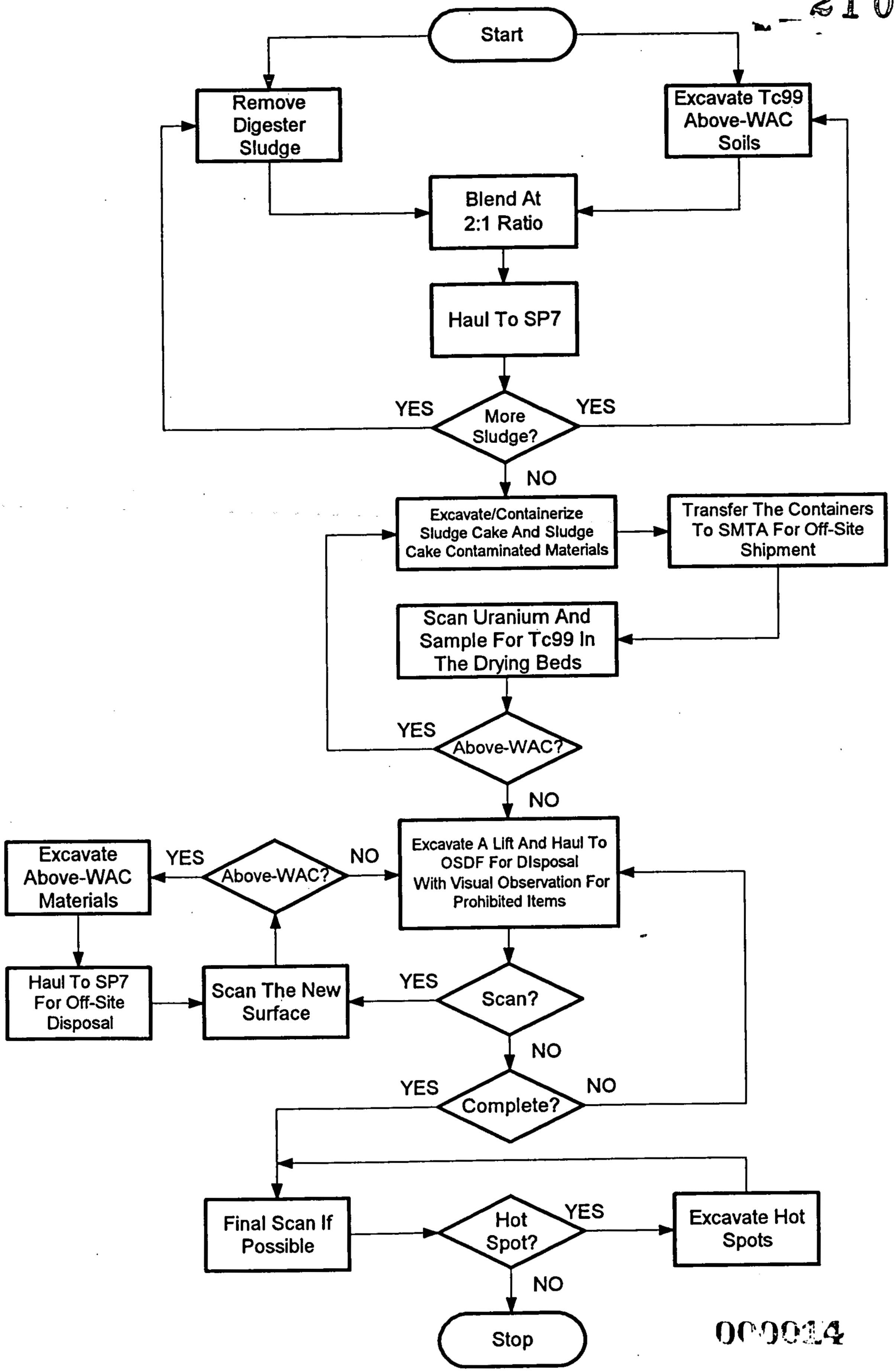
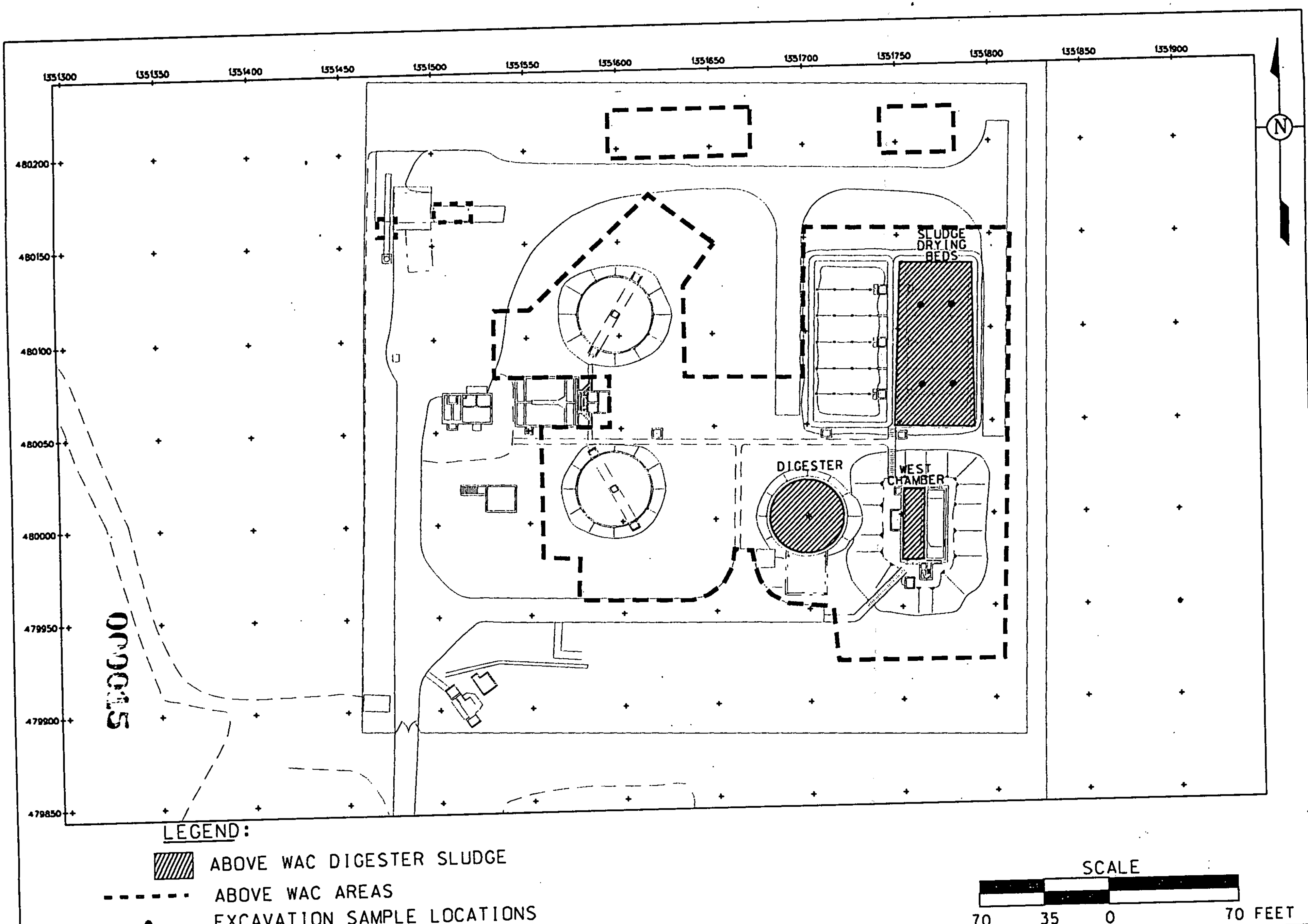


FIGURE 2-1 GENERAL EXCAVATION AND MONITORING SEQUENCE INSIDE STP



26-MAR-1999 FIGURE 2-2. PSP SAMPLE LOCATIONS

yl@5cj31@dgn@bmp@stp-1010.dgn
STATE PLANAR COORDINATE SYSTEM 1983

000015

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3.0 EXCAVATION MONITORING TECHNIQUES

A1PII excavation monitoring will be performed using the following techniques:

- Visual monitoring
- Field surveying
- Real time radiological monitoring
- Physical sampling.

3.1 VISUAL MONITORING

At a minimum, a FDF construction and a Waste Acceptance Organization (WAO) representative will visually monitor all excavation activities. This monitoring will detect special materials, prohibited items, and other situations. Visual inspection will be particularly significant in the following activities:

- During the removal of sludge cake contaminated material in the sludge drying beds. The exact limits of the berm material classified as above-WAC will be determined based on field observations.

- During the excavation activities in the STP area, the contractor is required to clean residue from debris prior to transport of the OSDF. Visible residue on the debris (that cannot be removed) will prevent placement of the debris into the OSDF.

- During the utility removal any additional sampling or monitoring will be based on visual observation of any leaks from the pipes or discoloration of the soil.

3.2 SURVEYING

Physical field surveys will be performed to verify that the required excavation depths have been attained.

3.2.1 Surveying in STP Deep Excavation Area

Field surveys will be performed before and after each lift to confirm that the proposed material has been excavated. FDF Construction personnel will inform the Characterization Lead or designee when excavation of a lift area is complete. In the STP area, two 3 $\pm$1foot lifts are anticipated to be performed. The Characterization Lead will then coordinate with the Surveying Lead to survey the defined lift area and its boundary, and with the RTIMP Lead for deployment of the RTRAK, RSS, and/or HPGe. Northing (Y), Easting (X), and elevation (Z) coordinate values will be determined using standard survey practices and standard positioning instrumentation [electronic total stations and Global Positioning System (GPS) receivers]. An average elevation will also be generated for the excavation lift area. This average elevation will normally include only the horizontal areas of the lift and no side walls. Field locations (i.e., lift area boundaries, measurement locations, grid points, above-WAC delineation if necessary) will be marked in a manner easily identifiable by all field personnel using survey stakes, flags, and/or water-based paint. Survey information (coordinate data) will be downloaded at the completion of each survey job (or at the end of each day) and transferred electronically to the Survey Lead. This information will be forwarded to the RTIMP and Characterization Leads or designees.

3.2.2 Surface Stripping Surveying

The excavation contractor per the technical specification will perform a pre-excavation survey, and a post-excavation survey to verify that appropriate amount of soil was removed from the area. This activity specifically applies to the six-inch stripping areas outside of the STP, and lead-stabilized excavation in the Trap Range.

3.3 REAL TIME MONITORING

When an excavation area is complete and the area has been field surveyed, the Characterization Lead will contact the RTIMP Lead and arrange for a real time scan. Figure 3-1 shows the general approach and decision making process for real-time scans.

3.3.1 *In Situ* Gamma Spectroscopy Equipment Determination

The excavation lift area will be characterized using *in situ* gamma spectroscopy equipment (RTRAK, RSS, and/or HPGe), consistent with DQO SL-051 and the User's Manual. A walk-down of the area by representatives from Characterization and/or RTIMP may be required to determine the type of *in situ* gamma spectroscopy equipment to use and if the excavation lift area is ready for *in situ* gamma spectroscopy. This walk-down will focus on the area accessability by RTIMP equipment, ensuring boundaries are marked or readily visible, ensuring that no excessive moisture is present, and that the area is free of obstructions that might damage equipment (reasonable grade and slopes, etc.).

Excavation lift characterization involves the use of the RTRAK or RSS to initially scan the excavation face of a lift (detection phase), followed by confirmation and delineation total uranium measurements with the HPGe, if needed. The HPGe will always be used if the confirmation and delineation is deemed necessary (Section 2.5). The overall use of *in situ* gamma spectroscopy for excavation characterization is described in detail in Sections 2.1, 2.3, 3.4, and 3.5 of the User's Manual.

In areas that are inaccessible by the RTRAK or RSS due to topography (narrow ditches and deep excavations), or other limiting conditions, the HPGe shall be used for initial screening. The decision to use any of these evaluation techniques will be made by the Characterization Lead or designee in consultation with the RTIMP Field Lead or designee.

3.3.2 Real-time *In Situ* Gamma Spectroscopy of the Excavation Lift Area

The RTRAK or RSS and/or HPGe detection systems will be used to scan as close to 100 percent of each excavation lift area as possible. A mapping van stationed outside the contamination area will receive, process, and generate maps of collected measurement data. The scanning and collection of measurement data will be conducted according to the applicable procedures and documents listed in Section 6.0. The following subsections summarize relevant information from these procedures and documents. Sections 3.1, 3.2, 4.1, 4.2, 4.3, and 5.7 of the User's Manual provide information and guidance relative to RTRAK, RSS, and HPGe measurement.

3.3.3 RTRAK or RSS Data Acquisition

The sodium iodide (NaI) detection systems (RTRAK or RSS) will be used to provide as close to 100 percent coverage as possible of the accessible excavation lift area. The spectral acquisition time will be 4 seconds, with data collected at a maximum detector speed of 1 mile per hour as assisted by the on-board GPS. The RTRAK or RSS passes will be made in a back and forth pattern, if possible, normally after two perimeter patterns have been completed. Alternatively, a circular pattern may be more appropriate. The RTRAK or RSS overlapping passes are achieved by placing the innermost RTRAK or RSS tires in the former outermost RTRAK or RSS tire track from the previous RTRAK or RSS pass, achieving an approximate 0.4 m overlap. Stakes or other markers may be used to stay on track. The RTRAK or RSS single measurement trigger level (Section 4.5 of the User's Manual) potentially requiring confirmation and delineation by the HPGe for total uranium will be 721 parts per million (ppm). If initial RTRAK or RSS scans indicate all total uranium data is below 721 ppm, no further confirmation or delineation with the HPGe is necessary.

The RTRAK or RSS measurements will be accompanied by GPS northing and easting coordinates and by the average elevation designated to represent each lift. GPS operations are described in Section 5.8 of the User's Manual.

3.3.4 HPGe Data Acquisition

As discussed in Section 2.2 of this plan, the HPGe shall be used for the initial scanning of an excavation lift area if the RTRAK or RSS is not used. If the HPGe is used without prior scanning by the RTRAK or RSS, a triangular grid (if practical) will be established with minimal overlap of measurement areas to achieve approximately 99.1 percent coverage (see Section 4.10 and Figure 4.10-1 of the User's Manual). A detector height of 1 meter and a spectral acquisition time of 5 minutes will be used. If more than one HPGe measurement is required, the center of the measurements should be located nominally 11 meters (approximately 36 feet) apart to achieve the 99.1% percent coverage.

The HPGe trigger level requiring potential confirmation and delineation for 1 meter HPGe measurements is 400 ppm for total uranium. If this initial HPGe scan indicates all data is below 400 ppm for total uranium, then no further confirmation or delineation with the HPGe is necessary. A trigger level of 400 ppm allows detection of total uranium WAC exceedances with a 1.5 m radius (Section 3.4.1 of the User's Manual).

HPGe measurements will be accompanied by GPS northing and easting coordinates and by the average elevation coordinate designated to represent each lift. One duplicate HPGe measurement will be collected for every 20 HPGe measurements performed. The duplicate will be collected immediately after the initial measurement at the same acquisition time and detector height.

3.3.5 Surface Moisture Measurements

Surface moisture measurements (used to correct data prior to mapping) will be collected with an *in situ* moisture measurement instrument (i.e., Troxler moisture gauge or Zeltex Infrared Moisture Meter) within 8 hours of the collection of the *in situ* gamma spectroscopy measurement and before ambient weather conditions change. Field conditions (such as weather) will be noted on the applicable electronic worksheet. Field moisture measurements and moisture-corrected data are discussed in detail in Sections 3.8 and 5.2 of the User's Manual.

When using the RTRAK, RSS, or HPGe, at least one surface moisture measurement will be collected for each excavation lift. More than one moisture measurement may be collected for each lift if the surface moisture of soil appears visibly different. If more than one moisture reading is obtained, the average of the readings will be used as the moisture measurement for the lift and to correct the real-time data. If a large difference in readings is noted by the RTIMP Lead or designee, the data will be re-evaluated.

When the HPGe is being used for confirmation, delineation or special materials, one surface moisture measurement will be collected and recorded at each HPGe measurement location.

If conditions prevent the use of a field moisture instrument, a default moisture reading may be used or a soil moisture core will be collected to a depth of 4 inches and submitted to the on-site laboratory for moisture analysis only (refer to Section 3.8 of the Real-Time User Manual for additional information). The percent moisture information will be used to correct RTRAK, RSS, or HPGe data in order to report data on a dry weight basis. Moisture analysis turnaround time must meet the real-time/ construction two-day turnaround schedule.

3.3.6 Safety and Health Concerns

If safety and health concerns are raised regarding elevated readings on hand-held radiological survey instruments, an HPGe gamma measurement can be taken over the area where the elevated readings are located. The intent of these measurement is to determine what isotopes are present (uranium *v.* thorium), and will be taken with a HPGe detector in order to determine if other isotopes are present. If the RTRAK or RSS is deployed, the same parameters described in Section 2.3.1 of this PSP will be used. If the HPGe is deployed, the most appropriate detector height for the applicable field of view with a spectral acquisition time of 5 minutes will be used. The measurement numbering scheme is as follows:

Excavation Area-Safety and Health-Sequential Number-HPGe Measurement

Where: Excavation Area = STP
Safety and Health = S&H
Sequential Number = 1, 2, 3, etc.
HPGe Measurement (if applicable) = G

Each measurement location will be surveyed to obtain a unique northing, easting, and elevation. The data determined from this gamma measurement will be used only to assist in the evaluation of heath and safety requirements and is not required for WAC determination.

3.3.7 Data Mapping

As the real-time measurements are acquired by the Survey and RTIMP Teams, the data will be electronically loaded into mapping software through manual file transfer or Ethernet. A set of maps will be given to A1PII Characterization Lead and WAO. Maps will be generated depicting the following:

Surface Scan Coverage Map(s)
- RTRAK or RSS Location Map (colored squares showing total uranium concentrations) - listing batch numbers
- HPGe Location Map (bubble map showing field of view and number for each HPGe measurement) including summary data printout for each HPGe measurement showing total uranium concentration
- Both RTRAK and HPGe measurements may be shown on the same map.

HPGe Confirmation/Delineation Map(s)
- HPGe Location Map (bubble map showing field of view and number for each HPGe measurement) - including summary data printout for each HPGe measurement showing total uranium concentrations

HPGe Special Material or Safety and Health Data
- Summary data printout for each HPGe measurement

The map and/or HPGe data summary printouts will be used to provide the Characterization Lead or designee with information to determine if additional scanning, confirmation, or delineation measurements are required.

3.3.8 Determining Need for Additional HPGe Measurements

If RTRAK, RSS scans or 1 meter detector height HPGe measurements are greater than trigger level concentrations, confirmation and delineation may be required (Section 2.3). This confirmation and delineation process is documented in the User's Manual (Section 3.4). The circumscribed boundary of the RTRAK, RSS, or 1-meter HPGe measurement above trigger limits will be located and marked (paint, flags, and/or stakes) in the excavation lift area by the Survey Lead or designee. The maximum activity location will be identified in the field using an alpha/beta hand-held frisker or equivalent instrument. HPGe detectors will be used for all confirmation and delineation measurements. Confirmation measurements shall be made using detector heights of 15 cm and/or 31 cm (depending on required field of view) and a spectral acquisition time of 5 minutes at the suspect above-WAC location to determine above-WAC boundaries. If either HPGe confirmation measurement exceeds the trigger level of 928 ppm, then the area exceeding the trigger level (i.e., above-WAC) shall be further delineated with the HPGe. The boundary of confirmed above-WAC material area shall be refined (delineated) using a detector height of 15 cm, with a spectral acquisition time of 5 minutes on a 2-meter triangular grid covering the entire area indicated by the detection and confirmation measurements. The excavation of the above-WAC area will be bounded by using these HPGe measurements.

Confirming and delineating the extent of contamination with 31 cm and 15 cm HPGe measurements is at the discretion of the Characterization Lead or designee. Conditions may arise which warrant a different decision process for defining the extent of contamination (i.e., obvious discoloration in the soil, brown/clear glass, process residue or other special materials).

Duplicate measurements will be performed in the same manner described in Section 2.3.2 (one per 20 measurements).

3.3.9 Tracking/Managing Data Collection

All RTRAK, RSS, and HPGe measurements will be assigned a unique identification for data tracking purposes. There are three essential components in the numbering scheme regardless of which measurement technique is used:

- Excavation area
- Lift area within the excavation area
- Lift sequence in lift area.

These three components, combined with additional designators and differentiated by their location (northing, easting, and elevation) and time, will allow for unique identification.

All RTRAK, RSS and HPGe measurements will contain some or all of the following designators.

1. Excavation area: Denotes major excavation area: STP

2. Lift area: Denotes location of lift within the excavation area, if appropriate. For example, the initial surface scan of the STP will not require a lift designation. The STP lift areas are designated as follows:

   I = Incinerator Area
   S = Sludge Drying Bed Area
   T = Trickle Filter Area
   D = Digester Building and Surrounding Area

3. Lift sequence: Designates the lift sequence (if used) with the first completed lift starting as 1 and the following lift as 2. (Only two lifts are expected.)

4. HPGe Measurement Number (if applicable): Designates the sequential numbering of HPGe measurements from a particular lift. The first measurement taken from a lift is 1 and any subsequent measurements are numbered sequentially (2, 3, 4, etc.).

5. Measurement designator: G = gamma measurements and associated moisture measurement

6. Quality control designators (as necessary): D = duplicate measurement

Using these guidelines, the unique identification scheme for each measurement technique is as follows:

RTRAK or RSS measurement identification: use 1, 2, 3 designators above.

Example: STP-I-2 where:

STP = Sewage Treatment Plant area
I = Incinerator area
2 = second lift in area I (approximately 4 - 8 feet deep)

HPGe Measurement Identification: use 1, 2, 3, 4, 5, and possibly 6 designators above.

Example: STP-I-2-3-G-D where:

STP = Sewage Treatment Plant area
I = Incinerator area
2 = second lift in area I (approximately 4 - 8 feet deep)
3 = third measurement in the active lift
G = gamma measurement
D = duplicate

Northing (Y) and easting (X) coordinates will be associated for each data point mapped from the RTRAK or RSS and HPGe in a lift area. An average elevation (Z) coordinate will be associated with each lift area and, therefore, each RTRAK or RSS batch and each set of lift HPGe measurements.

The maps generated from the real-time monitoring of the excavation lift area will be attached to the Excavation Monitoring Form (Figure 3-2). This form contains relevant information pertaining to the data collection, characterization review of the data, and WAO acceptance of the characterization. The use of this form is referenced in Procedure EW-1022, (On-Site Tracking and Manifesting of Bulk Excavated Material). The RTIMP Lead, Characterization Lead, and WAO representative or designees will complete this form for each lift area. The original forms will be placed in the WAO project files. Significant or unusual daily events will be recorded in field logs or log books by the appropriate organization.

3.4 PHYSICAL SAMPLING

As discussed in Section 2.1, four physical samples will be collected in the sludge drying beds after the above-WAC digester sludge and sludge cake are removed. The samples will be field located as shown in Figure 2-1. Samples will be collected from the top 0 to 6 inches. Samples will be collected using a 3-inch diameter plastic or stainless steel liner (for manual, direct push collection) or a Macro-core liner, as identified in procedure SMPL-01, Solids Sampling, and will be sealed using plastic end caps. At the discretion of the Field Sampling Manager, samples may be collected using other methods as specified in SMPL-01.

3.4.1 Analytical Requirements

Physical samples submitted for laboratory analysis will be sent to the on-site laboratory. Samples will be analyzed and reported to ASL B, with the results reported on a dry weight basis. The highest allowable minimum detection limit is 2.0 pCi/g, which is well below the WAC or FRL limit. Turnaround time for all samples is four days. The following table summarizes the sampling and analytical requirements.

Table 3-1
Sampling and Analytical Requirements

Analyte	Sample Matrix	Sample Type	Preser-vative	Lab	ASL	Holding Time	Container
Tc-99	Solid	Grab	None	On-site	B	6 Months	Capped plastic liner or 500 ml glass or plastic container

None of the data will be validated.

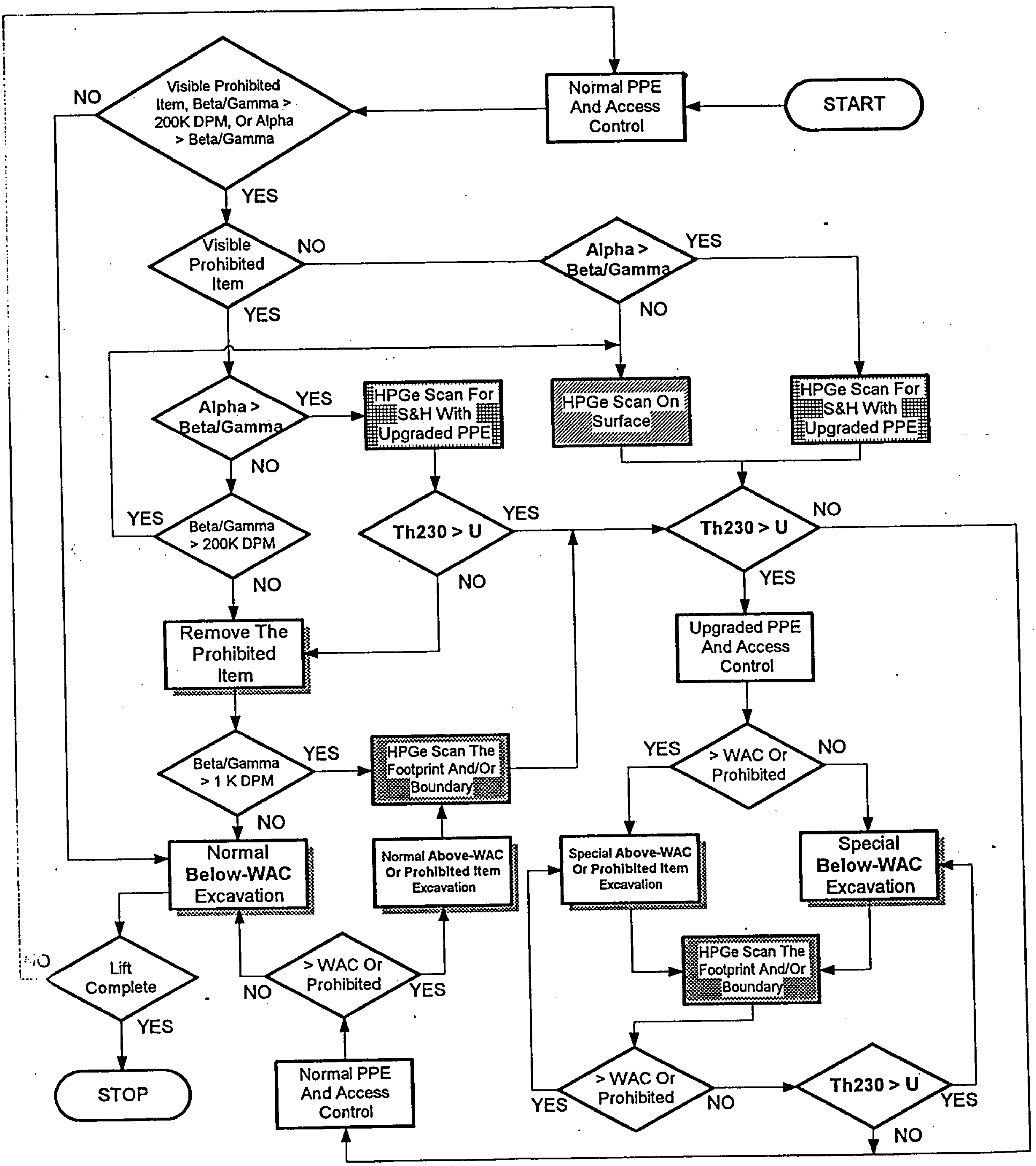

FIGURE 3-1 GENERAL DECISION MAKING PROCESS FOR REAL-TIME SCAN UNDER SPECIAL CONDITIONS BETWEEN EXCAVATION LIFTS

FIGURE 3-2

EXCAVATION MONITORING FORM

2109

1. Area Description:________________ Area ID (Lift Area / SM / EWF):________________
Comments:________________ PWID #:________________

2. Section 1 - Data Collection
Equipment Used ☐ RTRAK ☐ RSS ☐ HPGe Unit No: ________

Calibration Acceptable ☐ Yes Date: ________
Note: If not in calibration, do not use equipment until calibration is acceptable

3. RTRAK / RSS	4. HPGe
Map attached? ☐ Yes ☐ No	Data Report attached? ☐ Yes ☐ No
List of Batch #s: Coverage in accordance with PSP? ☐ Yes ☐ No If "No": ☐ Equipment Malfunction ☐ Rough Terrain ☐ Weather ☐ Standing Water ☐ Other:________ Data Verification Checklist attached? ☐ Yes ☐ No	List of Data Points: Data Verification Checklist attached? ☐ Yes ☐ No

5. This signature indicates the data generated for this area by this equipment on this day is correct and valid within the confines of equipment performance and as defined in PSP #: ________

________________ ________________

6. Section 2 - Characterization
Review real-time data
Sufficient real-time coverage? ☐ Yes ☐ No

Further action required: ________________

All data points < total uranium WAC? ☐ Yes ☐ No
If no, define > WAC area(s) and extent with HPGe if applicable (see attached real-time map) as defined in PSP.

The signature indicates this area has been characterized using the real-time data generated in Section 1 above and in accordance with PSP listed in Box 5.

________________ ________________
(Signature) (Signature Date)

7. Section 3 - WAO
Review attached documentation ☐ Yes MTL Designation ________________

This signature indicates this area can be excavated and dispositioned in accordance with the characterization provided in Section 2 above. ☐ Yes ☐ No and Reason:________________

________________ ________________
(Signature) (Signature Date)

Assigned Data Group for HPGe from WAO System Controls: ________

Instructions for the Excavation Monitoring Form: 2109

Box 1 Enter the Area Description (*excavation area*), Area ID [Lift Area / Special Material (SM) / Equipment Wash Facility (EWF)], Comments (if additional clarification is required) and PWID No.

Box 2 Check all the equipment used and enter the identification number for the HPGe detector used. If equipment is not in calibration, do not use until calibration is acceptable. Check yes if the calibration is acceptable and enter the date the calibration was performed. If more than one unit is used, a separate sheet for each unit number must be used.

Box 3 Check yes or no if a RTRAK map is attached. List the Batch Numbers associated with the referenced lift ID. Check yes or no if coverage is in accordance with the PSP. If the answer is no, give the reason that coverage was not in accordance with the PSP. If 'Other' is chosen as the reason, add a description of the reason. Check yes or no if the data verification checklist is attached. If the data verification checklist is not attached, explain why.

Box 4 Check yes or no if an HPGe data report is attached. List all the data points associated with the identified lift. Check yes or no if the data verification checklist is attached. If the data verification checklist is not attached, explain why.

Box 5 Enter the appropriate PSP number. Sign and date.

Box 6 Check yes or no if the real-time coverage is in accordance with applicable PSP. If the coverage is not as specified in the PSP, identify any further action required. Check yes if all the data points are less than Total Uranium WAC, if not check no. If data points are not all below WAC, define areas above-WAC and extent by filling out a separate form and attaching applicable map(s). Sign and date.

Box 7 Check yes if reviewed attached documentation. Enter Material Tracking Location (MTL) designator. Check yes if area can be excavated or no and explain why not. Sign and date. Fill in assigned (unique IIMS data group designator) data group for HPGe from WAO Systems Control.

NOTE:

Box 1 will be completed by the SCEP representative and/or WAO representative.
Boxes 2-5 will be completed by the RTIMP representative.
Box 6 will be completed by the SCEP representative.
Box 7 will be completed by the WAO representative.

4.0 QUALITY ASSURANCE REQUIREMENTS

Real-time data collection will be performed in accordance with the requirements in the latest revision of the SCQ and SCQ Addendum. The DQO for real-time excavation characterization under this plan is identified in DQO SL-051 (Appendix A).

4.1 SURVEILLANCE

Project management has the ultimate responsibility for the quality of the work processes and the results of the monitoring activities covered by this plan. The FEMP Quality Assurance (QA) organization may conduct independent assessments of the work process; this assessment will encompass technical and procedural requirements of this PSP and the SCQ. Independent assessments may be performed by conducting surveillances.

4.2 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, verbal approval must be obtained from the Characterization Lead, Real-Time Monitoring Manager, and QA Representative before the changes can be implemented (electronic mail is acceptable to document approval). Changes to the PSP will be noted in the applicable Field Activity Logs and on a Variance/Field Change Notice (V/FCN). QA must receive the completed V/FCN, with the signatures of the Project Manager, Characterization Lead, Real-Time Monitoring Manager, WAO, and the QA Representative within seven working days of the granting of the verbal approval.

5.0 SAFETY AND HEALTH

Personnel will conform to precautionary surveys by FEMP personnel representing the Utility Engineer, Industrial Hygiene, Occupational Safety, and Radiological Control.

All work performed on this project will be performed in accordance to applicable Environmental Monitoring project procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), FDF work permit, radiological work permit (RWP), penetration permits, and other applicable permits. Concurrence with all applicable safety permits is required by all personnel in the performance of their assigned duties.

All personnel performing measurements related to this project will be briefed on the Contractor Safe Work Plan for the A1PII specific work area and the briefing will be documented. Personnel who do not receive a briefing on these requirements will not participate in the execution of excavation activities related to the completion of assigned project responsibilities.

All emergencies shall be reported immediately on extension 911, or to the Site Communications Center at 648-6511 (if using a cellular phone), or using a radio and contacting "CONTROL" on channel 11.

6.0 DATA MANAGEMENT

The RTIMP group will provide hard copy maps and scan reports to the Characterization Lead and Data Management Contact or designees. RTRAK, RSS, or summary lift HPGe data will be collected for field WAC attainment decisions and reported at Analytical Support Level (ASL) A. All electronically recorded data will be verified by RTIMP after each data collection event, and documented by using the Checklist for Verification of Quality Control and Data Review Elements for RTRAK or HPGe Measurements (Section 5.4 of the Real Time User's Manual). Other field documentation, such as the Nuclear Field Density/Moisture Worksheet, will undergo an internal review by the RTIMP.

Electronically recorded data from the GPS, HPGe, and NaI systems will be downloaded on a daily basis to disks, or to the Local Area Network (LAN) using the Ethernet connection. The Characterization Lead or designee will be informed by the RTIMP Lead or designee when RTRAK, RSS, or HPGe measurements do not meet data quality control checklist criteria. The Characterization Lead or designee will determine whether additional scanning, confirmation, or delineation measurements are required.

Once the electronic data has been placed on the LAN, the Data Management Contact will perform an evaluation prior to placement into the Sitewide Environmental Database (SED). The evaluation may involve a comparison check between the electronic data, hard copy maps and summary reports for accuracy and completeness. After the data has been placed in the SED, the data will also be placed on the SCEP Web Site.

The original completed Excavation Monitoring Form, the real-time map(s), and HPGe summary data (if applicable) will be forwarded to WAO for placement in the WAO project files. Copies of other field documentation may be generated and provided to the Characterization Lead or Data Management Contact upon request. RTIMP will maintain all the real-time files and survey data will be maintained by the Survey Lead or designee.

7.0 APPLICABLE DOCUMENTS, METHODS, AND STANDARDS

Excavation characterization activities described in this plan shall follow the requirements outlined in the following documents, procedures, and standard methods:

- Sitewide Excavation Plan (SEP)
- Waste Acceptance Criteria Attainment Plan
- Impacted Materials Placement Plan
- Area 1, Phase II IRDP
- Area 1, Phase II Supplemental Characterization Package
- Sitewide CERCLA Quality Assurance Project Plan (SCQ) and Addendum
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of *In Situ* Gamma Spectroscopy at the Fernald Site (User's Manual), 20701-RP-0006, Revision B (1998)
- ADM-02 Field Project Prerequisites
- ADM-16 *In Situ* Gamma Spectrometry Quality Control Measurement
- ADM-17 *In Situ* Gamma Spectrometry Data Verification (Draft)
- EQT-22 High Purity Germanium Detector In-Situ Efficiency Calibration
- EQT-23 High Purity Germanium Detectors
- EQT-30 Operation of Radiation Tracking Sodium Iodide Detection System
- EQT-32 Troxler 3440 Series Surface Moisture/Density Gauge
- EQT-33 Real-Time Differential Global Positioning System Operation
- EQT-34 Radiation Scanning System
- EQT-39 Zeltex Infrared Moisture Meter
- 20300-PL-002 Real-Time Instrumentation Measurement Quality Assurance Plan
- EW-1022 On-Site Tracking and Manifesting of Bulk Excavated Material
- SMPL-01 Solids Sampling

APPENDIX A

DATA QUALITY OBJECTIVES SL-051

2109

Control Number ________

Fernald Environmental Management Project

Data Quality Objectives

Title: Excavation Monitoring For Total Uranium Waste Acceptance Criteria (WAC)

Number: SL-051

Revision: 1

Final Draft: 6/15/98

Contact Name: Keith Nelson

Approval: (Signature on File) Date: 06/15/98
William D. Kelley
DQO Coordinator

Approval: (Signature on File) Date: 06/15/98
Alan Theyken for J. D. Chiou
SCEP Project Director

Rev. #	0	1					
Effective Date:	6/09/98	6/15/98					

DATA QUALITY OBJECTIVES
Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)

Members of Data Quality Objectives (DQO) Scoping Team

The members of the scoping team included individuals with expertise in QA, analytical methods, field construction, statistics, laboratory analytical techniques, waste management, waste acceptance, data management, and excavation monitoring.

Conceptual Model of the Site

Fernald Environmental Management Project (FEMP) remediation includes the construction of an on-site disposal facility (OSDF) to be used for the safe permanent disposal of materials at or above the site final remediation levels (FRLs), but below the waste acceptance criteria (WAC) for constituents of concern (WAC COCs). The WAC concentrations for several constituents, including total uranium, were developed using fate and transport modeling, and were established to prevent a breakthrough of unacceptable levels of contamination (greater than a specified Maximum Contaminant Level to the underlying Great Miami Aquifer) over a 1000-year period of OSDF performance. The WAC for total uranium and other area-specific WAC COCs as referenced in the Operable Unit 5 (OU5) and Operable Unit 2 (OU2) Records Of Decision (RODs), the Waste Acceptance Plan for the On-Site Disposal Facility (WAC Plan), and the OSDF Impacted Materials Placement Plan (IMPP), must be achieved for all soil and soil-like materials that have been identified for disposal in the OSDF.

The extent of soil contamination requiring remediation was estimated and published in both the Operable Unit 5 and Operable Unit 2 Feasibility Studies (FS). These estimates were based on modeling analysis of available uranium data from soil samples collected during the Remedial Investigation (RI) efforts and from other environmental studies conducted at the FEMP. Maps outlining boundaries of soil contamination were generated for both the Operable Unit 5 and Operable Unit 2 FS documents by overlaying the results of the modeling analysis of uranium data with isoconcentration maps of other COCs. The soil contamination maps were further modified by conducting spatial analysis on the most current soil characterization data.

A sequential remediation plan has been presented which subdivides the FEMP into ten (10) independent remediation areas. Extensive historical sampling has demonstrated that in each of these 10 areas potentially above-WAC concentrations may not be present, may be limited to one WAC COC, or consist of a subset of WAC COCs. According to the Sitewide Excavation Plan (SEP) only WAC COCs with a demonstrated or likely presence in an area will be evaluated during remedial design and implementation. This DQO will be used to define the WAC decision-making process using excavation monitoring instrumentation in areas where soil and soil-like material is being excavated and total uranium is a WAC COC.

1.0 Statement of Problem

Adequate information must be available to demonstrate excavated soils are acceptable or unacceptable for disposal in the OSDF, based on the total uranium WAC.

Available Resources

Time: WAC decision-making information of sufficient quality must be made available to the Project Manager (or designee), characterization representative, and Waste Acceptance Operations representative (decision makers) prior to excavation and disposition of soil and soil-like materials.

Project Constraints: WAC decision-making information must be collected and assimilated with existing manpower and instrumentation to support the remediation schedule. Successful remediation of applicable areas, including excavation and placement of soil and soil-like material in the OSDF, is dependent on the performance of this work.

Summary of the Problem

Excavated soil must be classified as either of the following:

1. Having concentrations of total uranium at or above the WAC, and therefore, unacceptable for disposal in the OSDF, or

2. Having concentrations of total uranium below the WAC, and therefore, acceptable for disposal in the OSDF.

2.0 Identify the Decision

Decision

The WAC decision-making process will result in the classification of defined soil volumes as either meeting or exceeding the 1,030 ppm total uranium WAC.

Possible Results

1. A defined volume of soil has concentrations of total uranium at or above the WAC. This material is classified as unacceptable for placement in the OSDF, and will be identified, excavated, and segregated pending off-site disposition.

2. A defined volume of soil has concentrations of total uranium below the total uranium WAC. This soil is classified as acceptable for placement in the OSDF and is transported directly from the excavation to the OSDF for placement.

3.0 Identify Inputs That Affect the Decision

Required Information

The total uranium WAC published in the Waste Acceptance Criteria Attainment Plan for the OSDF, historical data, pre-design investigation data, and in-situ monitoring information collected prior to and during excavation are required to determine whether a specified volume of soil meets or exceeds the total uranium WAC.

Source of Informational Input

The list of sitewide OSDF WAC COCs identified in the OU2 and OU5 RODs and the WAC Plan will be referenced. Historical area specific data from the Sitewide Environmental Database (SED) will also be retrieved and evaluated for both radiological and chemical WAC constituents. This information will be utilized to determine area specific WAC COCs.

Non-invasive excavation monitoring in areas where total uranium is a WAC concern will involve measurements collected with mobile and/or stationary in-situ equipment such as the RTRAK and HPGe systems. These measurements will be collected from the surface of each excavation lift prior to excavation. Information compiled from this real-time monitoring will be assimilated and reviewed by decision makers to classify lifts or sections of lifts as either acceptable or unacceptable for placement in the OSDF.

Methods of Analysis

The most practical measurement methods with the required resolution will be employed to determine total uranium levels in the evaluated material in relation to the not-to-exceed (NTE) total uranium WAC in applicable areas.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: The boundaries where excavation monitoring for total uranium will be used is limited to soils and/or soil-like materials in remediation areas where total uranium is a WAC COC, excavation is planned, and material is designated for disposition in the OSDF.

Population of Soils:

Includes all at-and below-grade material (soils and soil-like materials) impacted with total uranium potentially exceeding the WAC and planned for disposition in the OSDF.

Scale of Decision Making

Areas designated for excavation will be evaluated as to whether the soil or soil-like material is below or above the OSDF WAC for total uranium. Excavation monitoring will be conducted on each excavation lift. Based on the information obtained as a result of reviewing and modeling existing data coupled with newly acquired excavation monitoring information, a decision will be made whether an individual excavation lift, or portion of a lift, meets or exceeds the OSDF WAC for total uranium.

Temporal Boundaries

Time frame: Real-time excavation monitoring information must be acquired and processed in time for review and use in decision making prior to excavation and disposition of excavated material.

Time Constraints on Monitoring: The scheduling of WAC excavation monitoring is directly tied to the excavation schedule. WAC excavation monitoring will be performed and a disposition decision made prior to excavation of each designated lift. Acquired information must be processed and reviewed by the project decision-makers prior to disposition of the lift being monitored. Time limits to complete measurements are specified in the excavation subcontracts.

Practical Considerations: Weather, moisture, field conditions, and unforseen events affect the ability to perform excavation monitoring and meet the schedule. To maintain safe working conditions, excavation and construction activities will comply with all FEMP and project specific health and safety protocols.

5.0 Develop a Logic Statement

Parameter(s) of Interest

The parameter of interest is the concentration of total uranium in soil or soil-like material designated for disposition in the OSDF.

Waste Acceptance Criteria Concentration

The OSDF WAC concentration is 1,030 ppm for total uranium in soil and soil-like materials. This concentration is considered a NTE level for OSDF WAC attainment, and no analytical data point or real-time measurement, as defined by the instrument-specific threshold values, can meet or exceed this level in material destined for the OSDF.

Decision Rules

If excavation monitoring results are below the total uranium WAC for a specified volume of soil, then that soil is considered acceptable for final disposition in the OSDF. If monitoring results reveal soil concentrations at or above the total uranium WAC, as indicated by exceeding the instrument-specific threshold level, then the unacceptable soil must be delineated, removed, and segregated pending off-site disposal.

6.0 Limits on Decision Errors

Range of Parameter Limits

The area-specific total uranium soil concentrations anticipated in excavation areas will range from background levels (naturally-occurring soil concentrations) to concentrations greater than the total uranium WAC levels.

Types of Decision Errors and Consequences

Decision Error 1: This decision error occurs when the decision makers decide a specified volume of soil is below the WAC for total uranium, when in fact the uranium concentration in that soil is at or above the WAC. This error would result in soil or soil like material with concentrations above the WAC for total uranium being placed into the OSDF. Since the WAC is a NTE level, this error is unacceptable.

Decision Error 2: This decision error occurs when a volume of soil or soil like material is identified as above WAC, excavated, and sent for off-site disposition when the material is actually below the WAC for total uranium. This error would result in added costs due to the unnecessary segregation and off-site disposition of material that is acceptable for disposal in the OSDF.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual concentration of total uranium in a volume of soil is greater than the WAC. The true state of nature for Decision Error 2 is that the actual concentration of total uranium in a volume of soil is below the WAC. Decision Error 1 is the more severe error.

7.0 Design for Obtaining Quality Data

7.1 WAC Attainment Excavation Monitoring

WAC decision-making will be based on real-time excavation monitoring using the RTRAK and HPGe systems. The sodium iodide system's threshold value (or trigger level) of 721 ppm for total uranium (70% of the 1,030 ppm WAC concentration for soil) is by agreement with the USEPA. Readings are obtained by RTRAK measurements using a spectral acquisition time of 4 seconds, and a detector speed of 1 mile per hour (mph) for each measurement. These parameters achieve the required sensitivity, and are the best compromise of practical considerations such as tractor speed and time in the field. (For more detailed information reference the *RTRAK Applicability Study, 20701-RP-0003, Revision 1, PCN1, May 15, 1998.*) Thorium can cause interferences with the total uranium. Uranium results associated with Thorium values greater than 500 net counts per second will be reevaluated.

The HPGe system confirmation and delineation threshold value of 928 ppm for total uranium with a spectral acquisition time of 5 minutes (300 seconds) and variable detector heights will be used in soil and soil-like material. Lower (more conservative) threshold values may be defined in the PSP. (For more detailed information reference the *User Guidelines, Measurement Strageties, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, 20701-RP-0006, Revision A, May 8, 1998.*)

Real-time monitoring of each excavation lift will be accomplished using the RTRAK. In areas inaccessible to the RTRAK, HPGe detectors will be used. In the event the monitoring data exceeds either trigger level (see above), the entire vertical thickness (3 ± 1 foot) of the areal extent of above-WAC material will be removed and segregated pending off-site disposal. Confirmation measurements using HPGe detectors may be performed. If directed by the characterization lead, the HPGe detectors will be placed directly over the zone of maximum activity identified by the RTRAK and an additional 5 minute measurement will be taken. If the HPGe confirmation measurement exceeds 928 ppm for total uranium, then additional HPGe measurements may be required for further horizontal delineation (detector height may be adjusted to increase the field of view).

7.2 Interpretation of Results

The results obtained from real-time monitoring for purposes of WAC attainment will be compared to the published OSDF WAC concentration for total uranium. If results are equal to or greater than the WAC concentration (as defined by exceeding the specific threshold value level), the decision makers may take one of the following actions:

- Determine that the entire unit volume or "lift" subjected to excavation monitoring is at or above WAC and requires segregation pending off-site disposal.
- Based on adequacy of existing information (including visual inspection), excavate and segregate the portion of the lift material that is at or above WAC pending off-site disposition.
- Perform additional real-time monitoring to more accurately delineate the areal extent of above-WAC contamination. Using this information, define the extent of removal efforts to be conducted.

7.3 QC Considerations

The following data management requirements will be met prior to evaluation of acquired WAC attainment information:

1) An excavation monitoring form will be completed and reviewed in the field.

2) WAC data and decision-making information will be assigned to respective soil profiles, so characterization and tracking information can be maintained and retrieved.

3) The mobile sodium iodide systems will generate ASL level A data. The HPGe detectors can provide either ASL level A or B data. In order for real time data to be

ASL B, it must meet the 10% data validation criterion in the SEP. Excavation monitoring data will be collected according to the applicable site procedures for the respective instrumentation.

4) When using the HPGe detectors, duplicate measurements will be taken at a frequency of one in twenty measurements or one per excavation lift, whichever is greater.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances shall be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Applicable Procedures

Real-time monitoring performed under the PSP shall follow the requirements outlined within the following procedures:

- ADM-16, In-Sutu Gamma Spectrometry Quality Control Measurements
- EQT-22, High Purity Germanium Detector In-Situ Efficiency Calibration
- EQT-23, Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors
- EQT-30, Operation of Radiation Tracking Vehicle Sodium Iodide Detection System
- EQT-32, Troxler 3440 Series Surface Moisture/Density Gauge
- EQT-33, Real-Time Differential Global Positioning System Operation
- EQT-34, Radiation Scanning System
- 20300-PL-002, Real Time Instrumentation Measurement Program Quality Assurance Plan
- EW-1022, On-Site Tracking and Manifesting of Bulk Impacted Material

7.6 References

- Sitewide CERCLA Quality Assurance Project Plan (SCQ), FD-1000, May 10 1995
- Sitewide Excavation Plan, April 1998, 2500-WP-0028, Revision D Draft Final
- Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility, January 1998, 20100-PL-0014, Rev. C Draft Final]
- Impacted Materials Placement Plan for the On-Site Disposal Facility, January 1998, 20100-PL-007, Revision 0
- Area 2, Phase 1 Southern Waste Units Implementation Plan for Operational Unit 2, October 1997, 2502-WP-0029, Revision C Draft
- RTRAK Applicability Study, May 1998, 20701-RP-0003, Revision 1
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, April 1998, 20701-RP-0006 Revision A

Data Quality Objectives
Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)

1A. Task/Description: Waste Acceptance Criteria Monitoring

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☐ RA ☒ R_vA ☐ OTHER

1.C. DQO No.: SL-051 DQO Reference No.: N/A

---

2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐

Soil and Soil Like Material ☒

Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) ________

---

3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A ☐ B ☐ C ☐ D ☐ E ☐

Risk Assessment
A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives
A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design
A ☐ B ☐ C ☐ D ☐ E ☐

Monitoring during remediation activities
A ☐ B ☐ C ☐ D ☐ E ☐

Other Waste Acceptance Evaluation
A ☒ B ☒ C ☐ D ☐ E ☐

4.A. Drivers: Specific construction work plans, Applicable or Relevant and Appropriate Requirements (ARARs) and Operable Unit 2 and Operable Unit 5 Records of Decision (ROD).

4.B. Objective: To provide data for identification of soils for compliance with Waste Acceptance Criteria.

5. Site Information (Description):

The RODs specify that FEMP soils will be below the WAC for disposal in the OSDF. WAC determination will be necessary for site soils that are scheduled for excavation and potential OSDF disposition.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH ☐
   Temperature ☐
   Specific Conductance ☐
   Dissolved Oxygen ☐
   Technetium-99 ☐

2. Uranium ☒
   Full Radiological ☐
   Metals ☐
   Cyanide ☐
   Silica ☐

3. BTX ☐
   TPH ☐
   Oil/Grease ☐

4. Cations ☐
   Anions ☐
   TOC ☐
   TCLP ☐
   CEC ☐
   COD ☐

5. VOA ☐
   BNA ☐
   Pesticides ☐
   PCB ☐

6. Other (specify) ☒
   Thorium, Moisture

6.B. Equipment Selection and SCQ Reference:

ASL A	RTRAK, HPGe	SCQ Section:	Section 3
ASL B	HPGe	SCQ Section:	Section 3
ASL C		SCQ Section:	
ASL D		SCQ Section:	
ASL E		SCQ Section:	

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased ☐ Composite ☐ Environmental ☐ Grab ☐ Grid ☐
Intrusive ☐ Non-Intrusive ☒ Phased ☐ Source ☐

DQO Number: SL-051

7.B. Sample Work Plan Reference: The DQO is being established prior to completion of the PSP.

Background samples: SED

8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks ☐ Container Blanks ☐
Field Blanks ☐ Duplicate Measurements ☒*
Equipment Rinsate Samples ☐ Split Samples ☐
Preservative Blanks ☐ Performance Evaluation Samples ☐
Other (specify) ______

*For the HPGe detectors, duplicate measurements will be made every 1 in 20 or one per lift, whichever is greater.

8.B. Laboratory Quality Control Samples:
Method Blank ☐ Matrix Duplicate/Replicate ☐
Matrix Spike ☐ Surrogate Spikes ☐
Other (specify) Per method

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.